Requirements Nightmare Put to Rest

F/A-18 Advanced Weapons Laboratory

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What We Do

The Advanced Weapons Lab, China Lake -- where Sensor / Smart Plane / Smart Bomb combinations are developed, and wired together to test their real-world, real-time performance - including full-scale, in-lab mock-ups prior to flying..

Requirements Collection

Requirements are like items at the grocery store. Wander around and pick out everything you like and place them in your shopping cart. But, when you get to the checkout stand, you better have the money to pay for it or the item goes back on the shelf.

Requirements Commitment

Functional Requirements Document

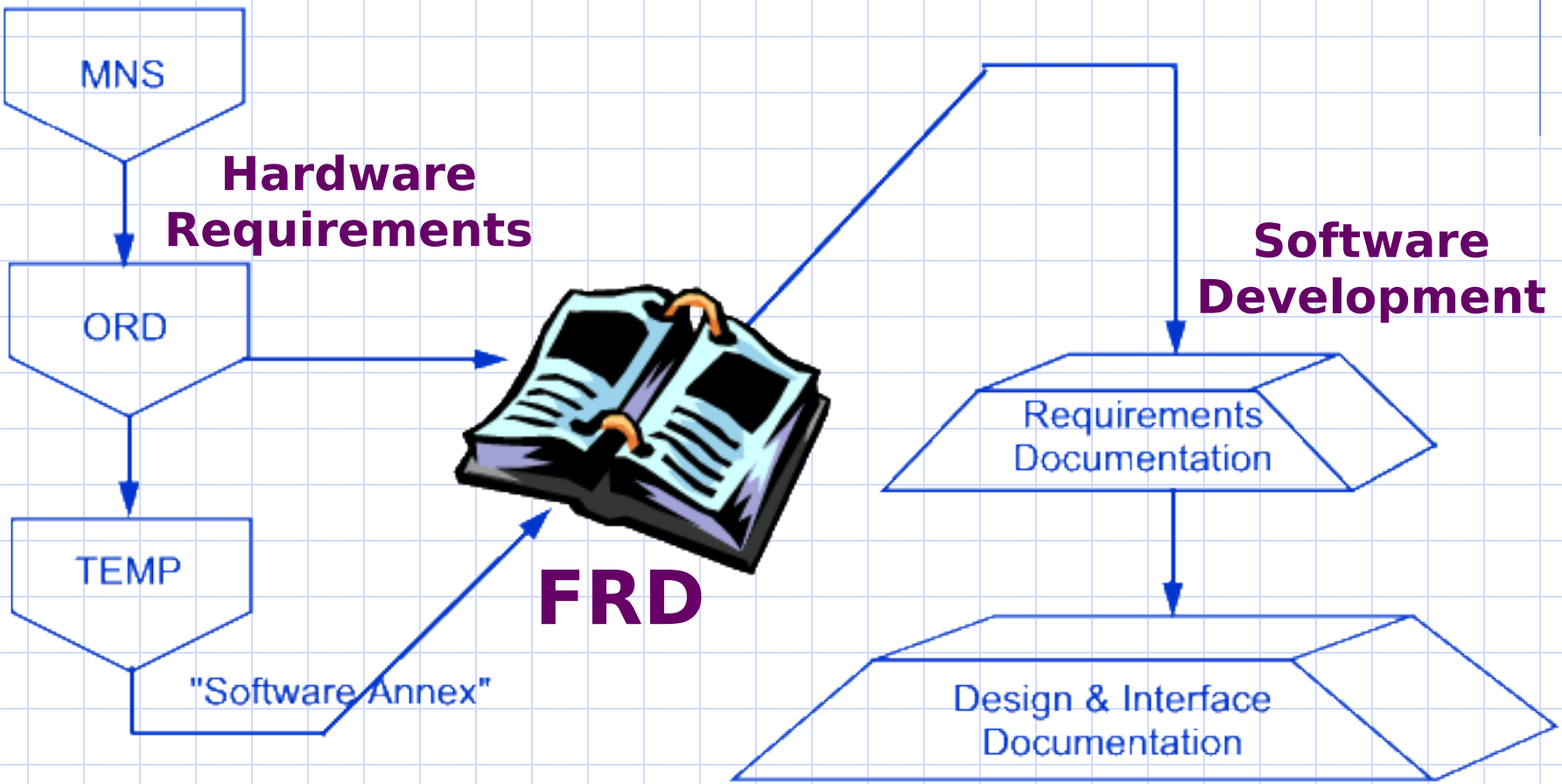
- Provides a record of approved requirements
- Captures requirements evolution
- Updated as late requirements are added
- Contains a system-level definition of functionality
- States the operational intent of each requirement

Link to Operational Testing

FRD is critical part of testing and evaluation

1. Provides a “Statement of Functionality” for use in Software Qualification TEMP
2. Ensures system/software is developed against same requirements as OT community will be testing
3. Identifies any operational limitations

FRD is Software Annex



FRD Structure

FRD

Functional Requirements Tree

Functional Requirements Sheets

- Operational Intent
- Requirements Statement
- Functionality Statement
- Operational Limitations

Functional Requirements Sheet

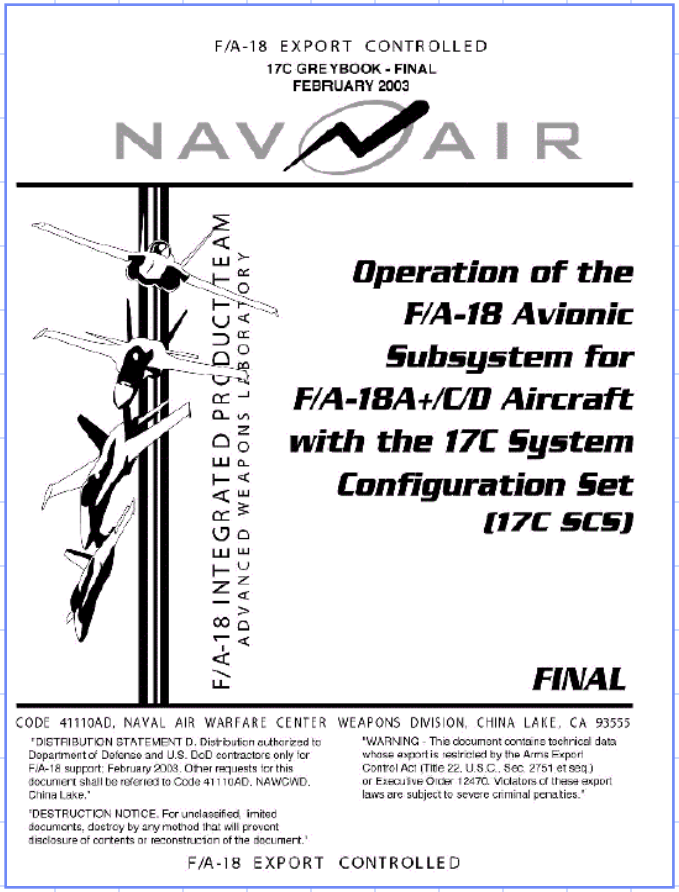
- Unique Identifier
- Descriptive title
- Functional Areas
- Requirement & Funding Source
- Associated documents
- Operational Intent
- Statement of Functionality
- Statement of Limitations

Baseline FRD

- Draft FRD taken to change review board
- Updated to reflect board decisions
- FRD approved by AWL, PMA-265, N-78
- Agreed upon requirements are baselined in FRD after:
  - Preliminary SCRB
  - Planning SCRB
  - Final SCRB

FRD Reuse

- SOF comes from requirements documentation
- FRD data used in Operator Manuals
- SOL reflects known anomalies
- Summarizes all changes in a given product release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Late Requirements

The clock is ticking and you're under pressure to meet schedule commitments, but you can't ignore those last-minute change requests.

What We Do Is . . .

- Charge for evaluating the impact of adding a late requirement
- Communicate impacts to ongoing development efforts via an impact assessment
- Obtain signatures and funding to go along with adding late requirements
- Document requirement changes in FRD

Impact Assessment (IA) Process

Entry Criteria – A sponsor has identified a candidate requirement for an ongoing development effort (i.e., after the Preliminary SCRB has been completed).

Input (Supplier) - Candidate Requirement (Sponsor)

1. **Develop Impact Assessment**
2. **Obtain AWL Approvals**
3. **Sponsor Decision (Yes/No)**

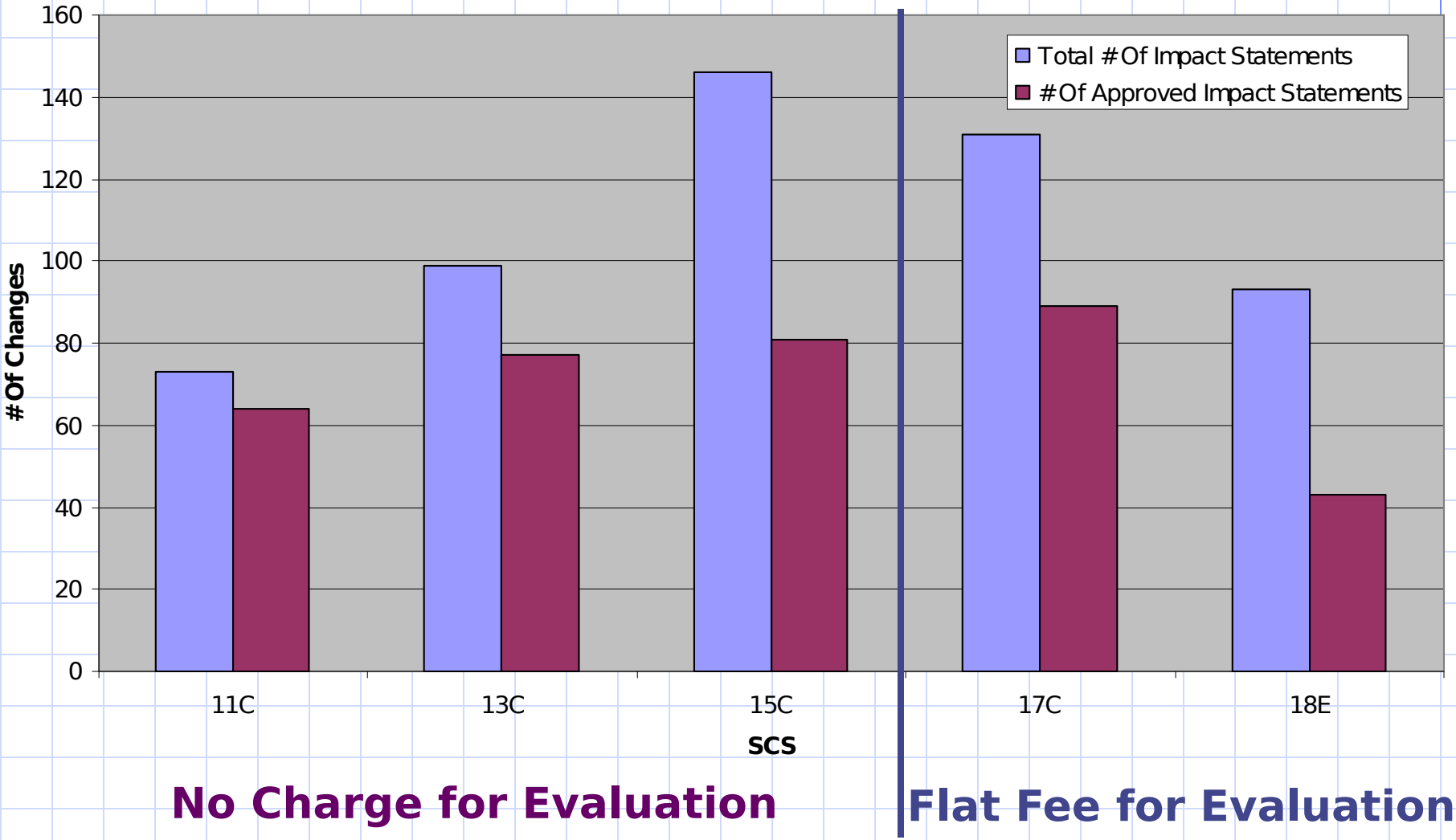
Exit Criteria – IA status has been communicated and retained. Approved impacts have been assigned unique identifiers and the FRD is updated.

Output (Customer) – Unique ID, Updated FRD, Updated cost/schedule/performance requirements, Archived IA, (AWL, Sponsors)

Impact Assessment Topics

- Cost
- Schedule
- Resource requirements
- Executability
- Risks
- Alternate solutions
- Foreign Military Sales (FMS) applicability
- Releasibility
- Performance/requirements impacts
- Options (if any)
- Additional work required by others outside the control of the AWL
- Assumptions

What We Learned . . .



No Charge for Evaluation

Flat Fee for Evaluation

What We've Changed . . .

- Comparable Based Estimate (CBE)
  - Written request
  - No cost for CBE preparation
  - Less than 2 hour estimate
  - Based on AWL experience and knowledge
  - Added disclaimer stating not for use in POM submissions
  - CBE must be approved and funding set aside prior to the AWL developing an Impact Assessment
- Decision Board for CBEs and IAs

Backup Slides

Sample FRS

Requirement Number: 5.65-1

Title: Modify LAT/LONG entry to a more common format

Functional Areas: CNI, GPS

Requirements: OAG (Priority 2 of 14)

Funding by: PMA-265

ASAP/DAG Date: Not Applicable

Associated Documents (if applicable): STR 3365

Category: 5 Discretionary

Sample FRS (Continued)

Operational Intent:
Incorporate the capability to display/enter Latitude/Longitude information in Degrees/Minutes/Thousandths of Minutes for commonality between Joint Forces while retaining the current Degrees/Minutes/Seconds format.

Statement of Requirements:
Change LAT/LONG entry to hours, minutes, and thousandths format. This is being done in interest of jointness, to make USN/USMC target databases coincide with U.S. Army & Air Force, DMA, USGS, other agencies' databases.

Sample FRS (Continued)

Statement of Functionality:
During multi-service/multi-national cooperative engagement, it is imperative to have clear communications, situational awareness, and navigation. The modifications of the position displays to the Joint Services configuration of Degrees/Minutes/Thousandths of minutes will enhance operations for waypoint insertion/display, A/C position and communication. However the current format of Degrees/Minutes/Seconds will be retained as is and be the default format on cold start of the A/C.

An additional pushbutton selection has been added to the HSI/ Data/Aircraft display format. Pushbutton 15 toggles between LATLN DCML (Lat/Long Degrees/Minutes/Thousandths of Minutes) and LATLN SEC (Lat/Long Degrees/Minutes/Seconds) throughout the aircraft. The DG/MN SEC format is all per current mechanization. The DG/MN THOU formats are individually discussed in the following paragraphs.

Sample FRS (Continued)

Statement of Limitations:

Because the format change to Degrees/Minutes/ Thousandths of Minutes requires the mission computer
to do a conversion, there is a delay when entering a position in Lat/Long DCML between the time that a UFC button is pressed and the time that the digit that
was entered appears on the scratchpad. This delay is
typically 1.5 seconds, which is much longer than the delay that occurs when entering a position in any other

Candidate Requirements

Sponsor (e.g., PMA, FMS) Provides $ to Estimate Requirement

Candidate Requirement to AWL

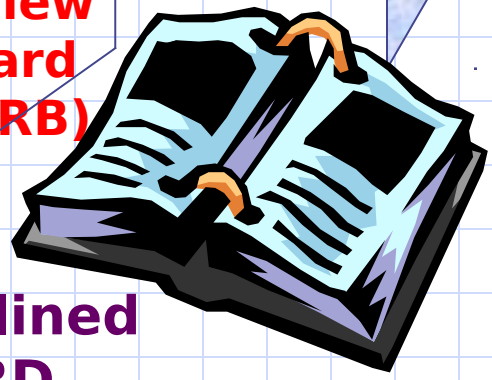
Team Estimates Candidate Rqmt

AWL Prepares Estimate & Draft FRD

Draft Functional Requirements Document

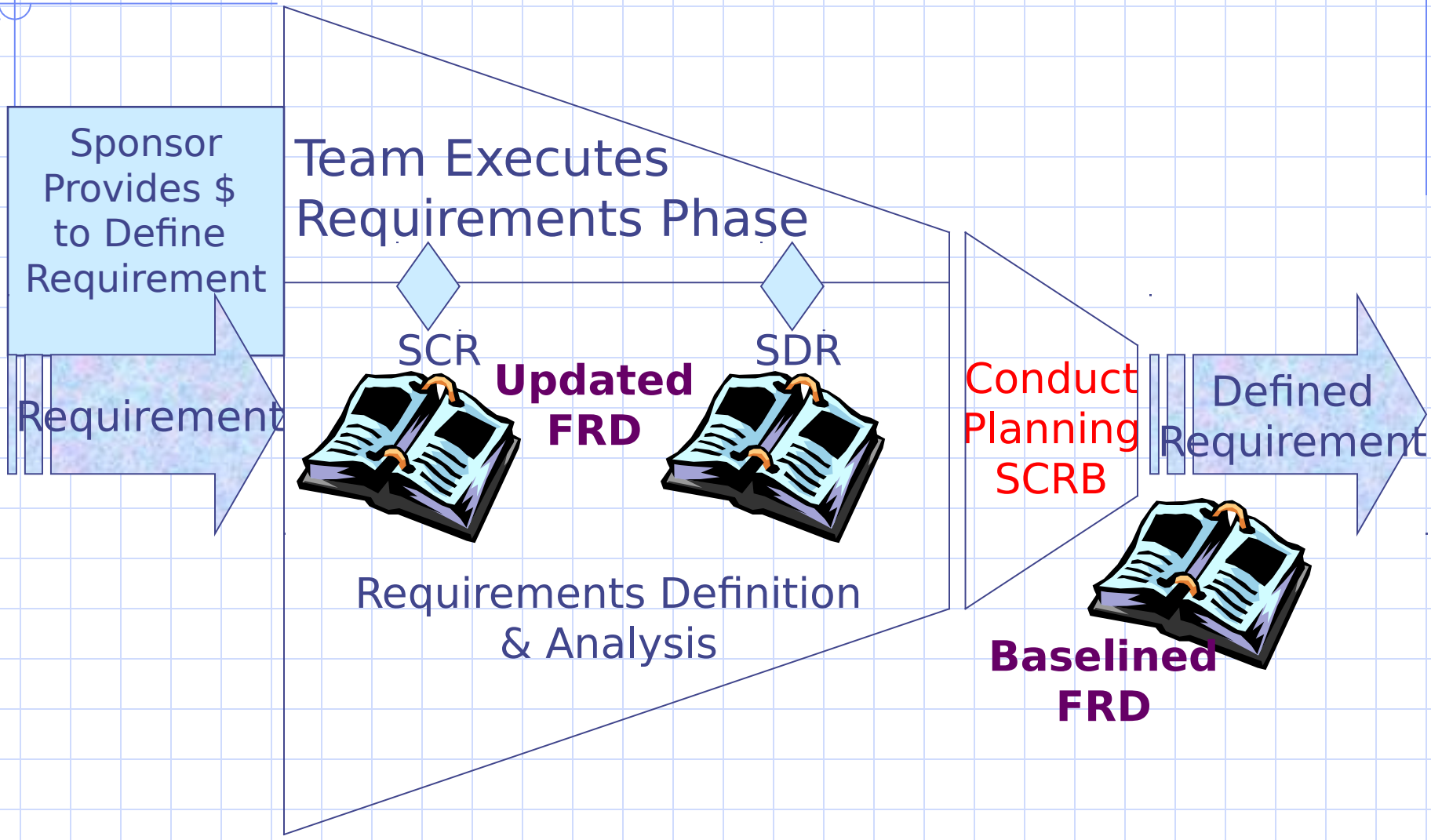
Conduct Prelim System Change Review Board (SCRB)

Requirement



Baselined FRD

Defining Requirements



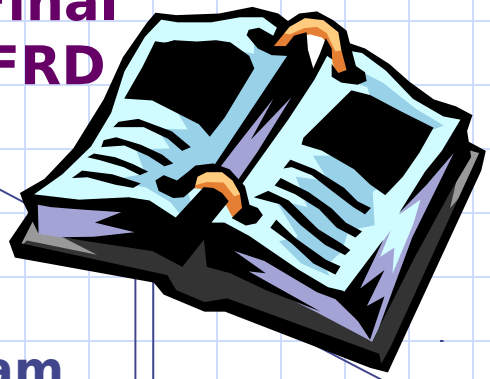
Integration & Test

Sponsor Provides $ to Implement Requirement

Defined Requirement

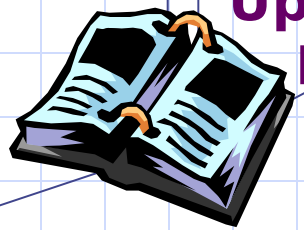
Team Executes Implementation Phase

Final FRD



Team Executes System Test Phase

Updated FRD



Conduct OTRR

Validated Requirement